What is claimed is:

1. A dispersion compensating device having an input and an output, the device comprising:

a dispersion compensating fiber having a dispersion more negative than about -50 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm;

a Raman gain fiber having a dispersion more positive than about -40 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm; and

a pump source operatively coupled to the dispersion compensating fiber and the Raman gain fiber, the pump source operating at a pump wavelength,

wherein the dispersion compensating fiber has a Raman Figure of Merit at the pump wavelength, and

wherein the Raman gain fiber has a Raman Figure of Merit at least about equivalent to the Raman Figure of Merit of the dispersion compensating fiber, and

wherein the dispersion compensating fiber and the Raman gain fiber are arranged in series between the input and the output of the device.

2. The dispersion compensating device of claim 1, wherein the Raman gain fiber has a Raman Figure of Merit of at least 10 W^{-1} at the pump wavelength.

3. The dispersion compensating device of claim 1, wherein the Raman gain fiber has a dispersion at the pump wavelength having an absolute value between about 15 ps/nm/km and about 25 ps/nm/km.

4. The dispersion compensating device of claim 1, wherein the Raman gain fiber has a dispersion slope at the pump wavelength between about -0.05 ps/nm^2/km and about 0.05 ps/nm^2/km.

5. The dispersion compensating device of claim 1, wherein the Raman gain fiber has a zero-dispersion wavelength at least about 50 nm greater than the pump wavelength of the pump source.

6. The dispersion compensating device of claim 1, wherein the Raman gain fiber has a core-to-cladding delta of at least about 1.8%, and a core radius of between about 1.8 μm and about 2.4 μm.

7. The dispersion compensating device of claim 1, wherein the dispersion compensating fiber has a dispersion slope more negative than -1.5 $ps/nm^2/km$ at 1575 nm,

8. The dispersion compensating device of claim 1, wherein the dispersion compensating fiber has a length of less than about 3 km.

9. The dispersion compensating device of claim 1, further comprising:

a trim fiber having substantially different dispersion properties than the dispersion compensating fiber and the Raman gain fiber, the trim fiber being arranged in series with the dispersion compensating fiber and the Raman gain fiber between the input and the output of the device..

10. The dispersion compensating device of claim 9, wherein the trim fiber has a dispersion more positive than about 8 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm.

11. The dispersion compensating device of claim 9, wherein the trim fiber has a dispersion slope between about 0 $ps/nm^2/km$ and about 0.15 $ps/nm^2/km$.

12. The dispersion compensating device of claim 9, wherein a length of transmission fiber is coupled to the input of the device, and wherein the properties and lengths of the dispersion compensating fiber, the trim fiber, and the Raman gain fiber are selected such that the absolute value of the residual dispersion is less than about 10% of the absolute value of the dispersion caused by the length of transmission fiber over a wavelength range of about 1555 nm to about 1615 nm.

13. The dispersion compensating device of claim 1, further comprising an enclosure, wherein the dispersion compensating fiber and the Raman gain fiber are connected in series inside the enclosure.

14. The dispersion compensating device of claim 1, wherein the dispersion compensating fiber has a length of less than about 3 km.

15. A method of amplifying and dispersion-compensating an input optical signal, the optical signal being propagated from a length of transmission fiber, the optical signal having an intensity and a positive chirp, the method yielding an output optical signal, the method comprising the steps of:

propagating the optical signal and a pump wave through a dispersion compensating fiber having a dispersion more negative than about -50 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm, and a Raman Figure of Merit; and

propagating the optical signal and a pump wave through a Raman gain fiber having a Raman Figure of Merit at least about equivalent than the Raman Figure of Merit of the dispersion compensating fiber, and a dispersion of more positive than about -40 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm.

16. The method of claim 15, wherein the dispersion compensating fiber and the Raman gain fiber are arranged in series.

17. The method of claim 15, wherein the Raman gain fiber has a Raman Figure of Merit of at least 10 W^{-1} at the pump wavelength.

18. The method of claim 15, wherein the Raman gain fiber has a dispersion at the pump wavelength having an absolute value between about 15 ps/nm/km and about 25 ps/nm/km.

19. The method of claim 15, wherein the Raman gain fiber has a dispersion slope at the pump wavelength of between about -0.05 ps/nm^2/km and about 0.05 ps/nm^2/km.

20. The method of claim 15, wherein the Raman gain fiber has a zero-dispersion wavelength at least about 50 nm greater than the pump wavelength of the pump source.

21. The method of claim 15, wherein the Raman gain fiber has a core-to-cladding Δ of at least about 1.8%, and a radius of between about 1.8 μm and about 2.4 μm.

22. The method of claim 15, wherein the dispersion compensating fiber has a dispersion slope more negative than -1.5 ps/nm^2/km at 1575 nm.

23. The method of claim 15, wherein the dispersion compensating fiber has a length of less than about 3 km.

24. The method of claim 15 wherein the dispersion compensating fiber and the Raman fiber are connected in series inside an enclosure.

25. The method of claim 15, further comprising the step of:

propagating the optical signal through a trim fiber having a dispersion more positive than about 8 ps/nm/km over a wavelength range of about 1555 nm to about 1615 nm.

26. The method of claim 25 wherein the dispersion compensating fiber, the Raman gain fiber, and the trim fiber are arranged in series.

27. The method of claim 25, wherein the trim fiber has a dispersion slope between about 0 ps/nm^2/km and about 0.15 ps/nm^2/km.

28. The method of claim 25 wherein the characteristics and lengths of the dispersion compensating fiber, the trim fiber, and the Raman gain fiber are selected such that the absolute value of the residual dispersion is less than about 10% of the absolute value of the dispersion caused by the length of transmission fiber over a wavelength range of about 1555 nm to about 1615 nm.

29. A Raman amplification device having an input and an output, the device comprising:

a Raman gain fiber having a profile selected to provide a dispersion of between about -25 ps/nm/km and about -15 ps/nm/km at a wavelength of 1450 nm

and a dispersion slope of between about 0 ps/nm^2/km and about 0.05 ps/nm^2/km at a wavelength of 1450 nm; and

a pump source operatively coupled to the Raman gain fiber.

30. The Raman amplification device of claim 29, wherein the Raman gain fiber has

a germania-doped core having an index profile having an α of between about 1.5 and about 2.5 and a radius of between about 1.8 μm and about 2.4 μm,

a cladding, and

a core-to-cladding Δ of at least about 1.8%.

31. The Raman amplification device of claim 29 wherein the Raman gain fiber has an effective area of no greater than about 19 μm^2 at a wavelength of 1450 nm and a Raman Figure of Merit of at least about 18 W^{-1} at a wavelength of 1457 nm.

32. The Raman amplification device of claim 29 wherein the Raman gain fiber has an attenuation of less than about 0.8 dB/km at 1450 nm and an attenuation of less than about 0.8 dB/km at 1550 nm.

33. A Raman amplification device having an input and an output, the device comprising:

a Raman gain fiber having

a germania-doped core having an index profile having an α of between about 1.5 and about 2.5 and a radius of between about 1.8 μm and about 2.4 μm,

a cladding, and

a core-to-cladding Δ of at least about 1.8%; and

a pump source operatively coupled to the Raman gain fiber.

34. The Raman amplification device of claim 28, wherein the Raman gain fiber has a dispersion of between about -25 ps/nm/km and about -15 ps/nm/km at a wavelength of 1450 nm and a dispersion slope of between about 0 ps/nm^2/km and about 0.05 ps/nm^2/km at a wavelength of 1450 nm.